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SOUTHERN COMPANY
Energy to Serve Your World℠

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50-364 50-425

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Joseph M. Farley Nuclear Plant
Vogtle Electric Generating Plant
Response to a Request for Additional Information on NRC Bulletin 2003-01
Potential Impact of Debris Blockage on Emergency Sump Recirculation
at Pressurized Water Reactors

Ladies and Gentlemen:

The U. S. Nuclear Regulatory Commission (NRC) issued NRC Bulletin 2003-01 to inform licensees of the potential for additional adverse effects due to debris blockage of flowpaths necessary for Emergency Core Cooling System (ECCS) and Containment Spray System (CSS) recirculation and containment drainage. These additional adverse effects were based on NRC-sponsored research that identified the potential susceptibility of pressurized-water reactor (PWR) recirculation sump screens to debris blockage in the event of a high energy line break (HELB) that would require ECCS and CSS operation in the recirculation mode.

In accordance with 10 CFR 50.54(f), the NRC requested a response within 60 days of the date of the NRC Bulletin to either: 1) state that the ECCS and CSS recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the NRC Bulletin and are in compliance with 10 CFR 50.46(b)(5) and all existing applicable regulatory requirements (Option 1); or 2) describe any interim compensatory measures that have been or will be implemented to reduce the risk which may be associated with the potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance has been completed (Option 2).

A103

SNC provided, in a letter dated August 7, 2003, the Farley Nuclear Plant and the Vogtle Electric Generating Plant responses to Option 2 of the Requested Information in Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003. SNC received a facsimile request for additional information (RAI) on August 30, 2004 and subsequently discussed the RAI with the NRC staff via telecon on September 10, 2004. The SNC response to these RAIs for Farley Nuclear Plant and the Vogtle Electric Generating Plant are provided in enclosure 1 and 2 respectively.

Mr. L. M. Stinson, states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments. If you have any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

L. M. Stinson

Sworn to and subscribed before me this 29 *day of* October, *2004.*

Notary Public

My commission expires: 6-7-05

LMS/CHM/DWM

Enclosures: 1. Farley Nuclear Plant Response to RAI
2. Vogtle Electric Generating Plant Response to RAI

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. L. M. Stinson, Vice President – Plant Farley
Mr. D. E. Grissette, Vice President – Plant Vogtle
Mr. J. R. Johnson, General Manager – Plant Farley
Mr. W. F. Kitchens, General Manager – Plant Vogtle
RType: CFA04.054; CVC7000; LC# 14157

U. S. Nuclear Regulatory Commission
Dr. W. D. Travers, Regional Administrator
Mr. S. E. Peters, NRR Project Manager – Farley
Mr. C. Gratton, NRR Project Manager – Vogtle
Mr. C. A. Patterson, Senior Resident Inspector – Farley
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

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Enclosure 1

Farley Nuclear Plant Response to RAI

Joseph M. Farley Nuclear Plant
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Enclosure 1

Farley Nuclear Plant Response to RAI

The following request for additional information was received from the NRC:

By letter dated August 8, 2003,[1] Southern Nuclear Operating Company (the licensee) provided the 60-day response to NRC Bulletin 2003-01 for the Joseph M. Farley - Units 1 and 2. The Bulletin requested the licensee to either (1) state that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Bulletin and are in compliance with all existing applicable regulatory requirements, or (2) describe any interim compensatory measures that have been implemented or that will be implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. The staff has completed its preliminary review of your response and has determined it needs the following additional information to complete our review:

NRC Question 1

On page 2 of Attachment 1 to your response to Bulletin 2003-0 1 you state that "FNP [Farley Nuclear Plant] will review WOG recommended procedural modifications when issued and determine if any FNP specific changes are required." The Westinghouse Owner's Group (WOG) has developed operational guidance in response to Bulletin 2003-01 for Westinghouse and CE type pressurized water reactors (PWRs). Please provide a discussion of your plans to consider implementing this new WOG guidance. Include a discussion of the WOG recommended compensatory measures that have been or will be implemented for your plant, and the evaluations or analyses performed to determine which of the WOG recommended changes are acceptable for your plant. Provide technical justification for those WOG recommended compensatory measures not being implemented by your plant. Also include a detailed discussion of the procedures being modified, the operator training being implemented, and your schedule for implementing these compensatory measures.

FNP Response

SNC has received the WOG operational guidance and is currently reviewing for implementation at FNP. Due to the current outage activities at FNP, the

[1] Actual date of letter was August 7, 2003.

discussion of our plans to implement this new WOG guidance is not available at this time. SNC will provide this discussion by November 30, 2004.

NRC Question 2

On page 3 of Attachment 1 to your response to Bulletin 2003 regarding containment drainage paths (Bulletin 2003-01 interim compensatory measure #5 from page 7 of the bulletin) you discuss cavity drain valves and their blind flanges. However, you do not discuss the various other quadrant or zone containment building drainage paths for providing containment sump inventory for the recirculation phase, and measures to ensure that these paths remain unblocked. Please respond regarding these measures at Farley Nuclear Plant.

FNP Response

The area of the refueling cavity, which is the area around the reactor head that is flooded prior to fuel movement, is the only significant area in containment that can retain water during an event that requires containment spray. As stated in the August 7, 2003 response, procedures insure that the cavity drain valves are open and their blind flanges removed after completion of refueling activities. Other zones around the refueling cavity are open to the emergency sump via large areas of grating or open areas around the outside edge of containment. This provides a clear drainage path for all condensate or sprayed water to reach the emergency sump for recirculation.

NRC Question 3

NRC Bulletin 2003-01 provides possible interim compensatory measures licensees could consider to reduce risks associated with sump clogging. In addition to those compensatory measures listed in Bulletin 2003-01, licensees may also consider implementing unique or plant-specific compensatory measures, as applicable. Please discuss any possible unique or plant-specific compensatory measures you considered for implementation at your plant. Include a basis for rejecting any of these additional considered measures.

FNP Response

The possible compensatory measures that SNC considered fell into the categories listed in Bulletin 2003-01; therefore, there were no unique or plant-specific compensatory measures additionally considered for SNC.

Joseph M. Farley Nuclear Plant
Vogtle Electric Generating Plant
Response to a Request for Additional Information on NRC Bulletin 2003-01
Potential Impact of Debris Blockage on Emergency Sump Recirculation
at Pressurized Water Reactors

Enclosure 2

Vogtle Electric Generating Plant Response to RAI

Joseph M. Farley Nuclear Plant
Vogtle Electric Generating Plant
Response to a Request for Additional Information on NRC Bulletin 2003-01
Potential Impact of Debris Blockage on Emergency Sump Recirculation
at Pressurized Water Reactors

Enclosure 2

Vogtle Electric Generating Plant Response to RAI

The following request for additional information was received from the NRC:

By letter dated August 8, 2003,[2] Southern Nuclear Operating Company (the licensee) provided the 60-day response to NRC Bulletin 2003-01 for the Vogtle Electric Generating Plants - Units 1 and 2. The Bulletin requested the licensee to either (1) state that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Bulletin and are in compliance with all existing applicable regulatory requirements, or (2) describe any interim compensatory measures that have been implemented or that will be implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. The staff has completed its preliminary review of your response and has determined it needs the following additional information to complete our review:

NRC Question 1

On page 2 of Attachment 2 of your response to Bulletin 2003-01 you state that all licensed operators will receive "more detailed information and guidance on ECCS and CSS emergency sump blockage" by February 23, 2004. However, your response does not completely discuss the operator training to be implemented. Please provide a detailed discussion of the operating procedures to be implemented, the indications of sump clogging that the operators are instructed to monitor, and the response actions the operators are instructed to take in the event of sump clogging and loss of ECCS recirculation capability.

VEGP Response

NRC Bulletin 2003-01 on sump blockage was a topic in Licensed Operator Requalification Training segment one in 2004 (Jan 12 – Feb 13). The training included classroom training on the bulletin itself, the Vogtle procedures that address emergency sump recirculation, and the Operations Department Standing Order that provides interim guidance to operators. As well, licensed operators were exposed to a simulator demonstration of a sump blockage event.

The classroom lecture (Current Events Class, LORQ 20041) included a review of the following topics: the issuance of the NRC bulletin and the events that prompted it, the specific parameters available to the operator to diagnose sump

[2] Actual date of letter was August 7, 2003.

blockage such as pump flow, suction/discharge pressure, and motor amp fluctuations, the specific Residual Heat Removal (RHR) pump response to sump blockage including the pump going onto mini-flow due to lowering flow conditions, transition to ECA 1.1, *Loss of Emergency Coolant Recirculation Capability,* in response to sump blockage, the Operations Standing Order C-2003-5 which was used as an interim response on shift to highlight the indications of sump blockage and considerations for addressing the problem. This Standing Order remains active in the Control Room.

The simulator training (Simulator Exercise Guide RQ-SE-04102, LORQ 20041) included a discussion of the LOCA scenario leading to a sump recirculation condition. The instructor then led the crew through a sump blockage demonstration including a discussion of symptoms and the appropriate operator response. The training crew then implemented ECA 1.1 for recovery. The ECA 1.1 actions that were stressed included continued attempts to restore emergency coolant recirculation, increase/conserve refueling water storage tank (RWST) Level, initiate cooldown to cold shutdown, depressurize the RCS to minimize Reactor Coolant System (RCS) subcooling, try to add make-up to the RCS from an alternate source, depressurize Steam Generators to cool down and depressurize the RCS, and maintain RCS heat removal. The instructor then reviewed the differences in partial and complete blockage.

NRC Question 2

On page 2 of Attachment 2 to your response to Bulletin 2003-0 1 you state that "VEGP [Electric Generating Plant] will review WOG recommended procedural modifications when issued and determine if any VEGP specific changes are required. The Westinghouse Owner's Group (WOG) has developed operational guidance in response to Bulletin 2003-01 for Westinghouse and CE type pressurized water reactors (PWRs). Please provide a discussion of your plans to consider implementing this new WOG guidance. Include a discussion of the WOG recommended compensatory measures that have been or will be implemented for your plant, and the evaluations or analyses performed to determine which of the WOG recommended changes are acceptable for your plant. Provide technical justification for those WOG recommended compensatory measures not being implemented by your plant. Also include a detailed discussion of the procedures being modified, the operator training being implemented, and your schedule for implementing these compensatory measures.

VEGP Response

Candidates for Operator Action (COAs) to be implemented:
COA 5 - Refill of RWST

Basis: Vogtle's current guidance exists in ECA-1.1 (19111-C *Loss Of Emergency Coolant Recirculation)* to extend the time ECCS and CS pumps can take suction from the RWST. This guidance is also in ECA-1.3, *Recirculation Sump Blockage* and will be incorporated in 19113-C *Recirculation Sump Blockage.*

COA 7 - More aggressive cooldown and depressurization guidance for small break LOCA.

Basis: Vogtle currently uses an aggressive cooldown and depressurization method in ECA-1.1 *(19111-C Loss Of Emergency Coolant Recirculation)* with limits based on our Technical Specifications. We intend on using this same method in our new ECA-1.3 *(19113-C Recirculation Sump Blockage.)*

COA 8 - Provide guidance on symptoms and identification of containment sump blockage.

Basis: Specific indications of sump blockage will be spelled out within ES-1.3 (19013-C *Transfer to Cold Leg Recirculation)*, ECA-1.1 (19111-C *Loss Of Emergency Coolant Recirculation)*, and ECA-1.3 *(19113-C Recirculation Sump Blockage)*. Operators will be directed to monitor RHR pump flow, discharge pressure, and motor amps. Since Containment Spray pump parameters can only be monitored locally, operators will be directed to monitor these parameters (suction and discharge pressure) locally if conditions allow. Currently ES-1.3 and ECA-1.1 have directions to check containment sump levels. Current applicable Emergency Operating Procedures (EOPs) (E-1, 19010-C *Loss of Reactor or Secondary Coolant*, ES-1.1, 19011-C *SI Termination*, and ES-1.2, 19012-C *Post LOCA Cooldown and Depressurization*) have a transition on their foldout page to ECA-1.1.

COA 9 - Develop contingency actions to be taken in response to containment sump blockage.

Basis: Explicit guidance in the form of a new procedure 19113-C will be written based on the new ECA-1.3, *Recirculation Sump Blockage*. Transitions from ES-1.3 *(19013-C Transfer to Cold Leg Recirculation)*, and ECA-1.1 *(19111-C Loss Of Emergency Coolant Recirculation)*, will direct the operating crew to the new EOP, 19113-C.

A Verification and Validation (V&V) will be performed before training segments begin in 2005 and operators will be trained during the first two segments of 2005 on the response to emergency sump blockage. The new procedures will go into effect approximately July 8, 2005.

Candidates for Operator Action (COAs) not selected for implementation:

COA 1A – Operator action to secure one containment spray pump before recirculation alignment.

Basis: By design, both trains of spray and RHR have separate, independent sumps; therefore, securing one spray pump will only stop the flow rate and the differential pressure across that sump. This evolution will have no impact to the other sumps. Also, additional operator actions listed below may interfere with other time critical actions after the postulated accidents:

- Verify both containment spray pumps are operating
- Prior to stopping, verify containment pressure and temperature
- Verify that containment fan coolers are operating

The probability of human error on any task is assumed to be increased due to the current stressful environment; therefore, the added burdens will impact the operator's concentration while further increasing the risk of error. Finally, securing one spray pump has virtually no effect on the time to start containment recirculation during a large break LOCA. For example, if the operator secured one spray pump as soon as a safety injection began, then less than 3 minutes would be added to the shortest injection mode time of 19 minutes as stated in FSAR 6.3.2.2.9.1 Injection Mode Allowance. This is assuming that one Containment Spray pump delivers 3200 gal/min which reduces the maximum injection flow of 15,600 gal/min to 12,400 gal/min.

COA 1B - Operator action to secure both spray pumps before recirculation alignment.

Basis: In addition to the basis for COA 1A, one train of containment spray is required for containment pressure and dose control.

COA 2 – Manually establish one train of containment sump recirculation prior to automatic recirculation swapover.

Basis: This COA was not considered since the additional operator action may interfere with other time critical actions after the postulated accidents. FSAR 6.3.2.2.9.1 Injection Mode Allowance states that the shortest injection mode operation is approximately 19 minutes. During the 19 minutes, recirculation swap for RHR must occur. Also, to accomplish COA 2, one train of ECCS and CS taking suction from the RWST are secured and are made available if the operating pumps placed on recirculation experience clogging. Also, during the 19 minutes, operators would need to establish one train of containment sump recirculation alignment prior to the minimum FSAR swap over limit while verifying that a minimum of 13.5 inches of water is available in the containment sumps per ES-1.3. Additionally, if the operator secured one spray pump as soon as a safety injection began, then less than 3 minutes would be added to the shortest injection mode time of 19 minutes as stated in

FSAR 6.3.2.2.9.1 Injection Mode Allowance. This is assuming that one CS pump delivers 3200 gal/min which reduces the maximum injection flow of 15,600 gal/min to 12,400 gal/min.

COA 3 – Terminate one train of safety injection after recirculation alignment.

Basis: Current VEGP licensing bases indicates adequate post-LOCA core cooling with only one train of ECCS in operation. A single failure of the operating ECCS train after the plant operator has secured one train of ECCS would result in an interruption of ECCS flow until the operator could manually re-start the secured ECCS train. Since the current FSAR Chapter 15 analyses does not account for this potential interruption in ECCS flow, significant reanalysis and a potential licensing amendment would be required. This scenario has been analyzed in WCAP-16204 Appendix B using the RELAPS computer code. Westinghouse has concluded that because fuel clad surface temperatures would rise very rapidly, it is expected peak cladding temperature acceptance criterion could be exceeded. Additionally, it is not expected that sufficient time would be available for operators to perform effective mitigative actions. Based on the above discussions, VEGP has not selected COA 3 for implementation.

COA 4 – Early termination of one RHR pump prior to recirculation alignment.

Basis: COA 4 does not apply to Westinghouse designed plants per WCAP 16204.

COA 6 – Injection of more than one RWST volume or alternate water source bypassing the RWST.

Basis: Two RWST volumes are approximately1.3 million gallons. Injection of more than one RWST volume will place containment above the maximum flood level of elevation of 181 feet and 4 inches (approximately 944,000 gallons). Additionally, two volumes are addressed in severe accident control room guideline SACRG-2. However, using an alternate water source to make up is addressed in ECA 1.1, *Loss of Emergency Coolant Circulation,* and does not need to be revisited. Therefore, COA 6 will not be selected for implementation.

COA 10 – Termination of one train of HPSI prior to recirculation alignment.

Basis: COA 10 evaluation is applicable to Combustion Engineering-designed plants only.

COA 11 – Prevent or delay Containment Spray for small break LOCAs.

Basis: COA 11 is only applicable for plants with ice-condenser containments per WCAP 16204,

NRC Question 3

On page 3 of Attachment 2 to your response to Bulletin 2003 regarding containment drainage paths (Bulletin 2003-01 interim compensatory measure #5 from page 7 of the bulletin) you discuss cavity drain valves and their blind flanges. However, you do not discuss the various other quadrant or zone containment building drainage paths for providing containment sump inventory for the recirculation phase, and measures to ensure that these paths remain unblocked. Please respond regarding these measures at Vogtle Electric Generating Plant.

VEGP Response

The only location inside the containment where water may be trapped and prevented from returning to the containment emergency sumps is the reactor cavity. Water can enter the cavity by flowing down through the ventilation openings surrounding the reactor cavity seal ring. Approximately 113,200 gal of water could collect in the reactor cavity. This would cause the static head for the residual heat removal (RHR) and spray pumps to decrease by about 1.31 ft. This decrease would not impair the operation of these pumps. Most of the water entering the refueling canal is returned to the containment emergency sumps via two, normally open, 12-in. drain lines. (Ref. FSAR section 6.2.1.1.2.E) Other zones around the refueling cavity are open to the emergency sumps via large areas of grating or open areas around the outside edge of containment. This provides for a clear drainage path for all condensate or sprayed water to reach the emergency sumps for recirculation.

NRC Question 4

NRC Bulletin 2003-01 provides possible interim compensatory measures licensees could consider to reduce risks associated with sump clogging. In addition to those compensatory measures listed in Bulletin 2003-01, licensees may also consider implementing unique or plant-specific compensatory measures, as applicable. Please discuss any possible unique or plant-specific compensatory measures you considered for implementation at your plant. Include a basis for rejecting any of these additional considered measures.

VEGP Response

The possible compensatory measures that SNC considered fell into the categories listed in Bulletin 2003-01; therefore, there were no unique or plant-specific compensatory measures additionally considered for SNC.